

CLAIMS

What is claimed is:

- 5 1. A method for operating a Redundant Array of Inexpensive Disks (RAID) to
recover from read errors comprising:
 in a disk controller,
 detecting that a read error has occurred in a sector associated with a
particular Logical Block Address (LBA_i) in a primary disk portion;
10 reporting an unrecoverable read error at LBA_i ;
 remapping the sector originally associated with the LBA_i for which the
read error occurred to a replacement sector;
 in a RAID controller,
 receiving a report of an unrecoverable read error at LBA_i ;
15 retrieving data from a mirror disk portion associated with the primary
disk portion that contains LBA_i; and
 writing the same data thereby retrieved to the LBA_i on the primary disk
portion for which the error was specified.
- 20 2. A method as in claim 1 additionally comprising the step of:
 reading the data back from LBA_i on the primary portion; and
 if the data is read back from LBA_i without a further read error,
 not activating the mirror disk portion.
- 25 3. A method as in claim 1 wherein the mirror disk portion is located at LBA_{i+k} in a
physical disk drive that is different from the physical disk drive on which LBA_i is
stored.

4. A method as in claim 1 additionally comprising:
in the RAID controller,
after detecting the unrecoverable read error,
executing a background process to regenerate the contents of the
primary disk section that contains LBA_i.
- 5
5. A method as in claim 1 additionally comprising:
if the step of writing the same data retrieved from the mirror fails, then
replacing the primary disk section that contains LBA_i.
- 10
6. A method as in claim 1 additionally comprising:
if the step of writing the same data retrieved from the mirror succeeds, then
not activating a mirror portion for LBA_i.
- 15
7. A method as in claim 1 wherein the disk controller is located in a common
assembly with disk hardware.
8. A method as in claim 1 wherein the RAID controller is located in a processor
that is a separate assembly from the disk hardware.
- 20
9. An apparatus for operating a Redundant Array of Inexpensive Disks (RAID) to
recover from read errors comprising:
a disk controller, connected to a primary disk portion, the disk controller for
detecting that a read error has occurred in a sector associated with a particular Logical
Block Address (LBA_i) in a primary disk portion, and in response thereto, reporting an
unrecoverable read error at LBA_i, and further for remapping the sector originally
associated with the LBA_i for which the read error occurred to a replacement sector;
a RAID controller, connected to the disk controller, and for receiving the report
of an unrecoverable read error at LBA_i therefrom, and in response thereto, for retrieving
- 25

data from a mirror disk portion associated with the primary disk portion that contains LBA_i , and then writing the same data thereby retrieved to the LBA_i on the primary disk portion for which the error was specified.

- 5 10. An apparatus as in claim 9 wherein the RAID controller is additionally for reading the data back from LBA_i on the primary portion, and for preventing activation of the mirror disk portion if the data is read back from LBA_i without a further read error.
- 10 11. An apparatus as in claim 9 wherein the mirror disk portion is located at LBA_{i+k} in a physical disk drive that is different from the physical disk drive on which LBA_i is stored.
- 15 12. An apparatus as in claim 9 wherein the RAID controller, after detecting the unrecoverable read error, additionally executes a background process to regenerate the contents of the primary disk section that contains LBA_i .
- 20 13. An apparatus as in claim 9 wherein if writing the same data retrieved from the mirror fails, then the RAID controller replaces the primary disk section that contains LBA_i .
- 25 14. An apparatus as in claim 9 wherein if writing the same data retrieved from the mirror succeeds, then the RAID controller does not activate a mirror portion for LBA_i .
- 15 15. An apparatus as in claim 1 wherein the disk controller is located in a common assembly with disk hardware.

- 18 -

16. An apparatus as in claim 1 wherein the RAID controller is located in a processor that is a separate assembly from the disk hardware.